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Car Black Box System for Accident Analysis Using IoT

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Abstract: *The car black box is used to analyses the cause of accidents like an airplane black box. This paper proposes a model of a car black box system which can be installed in the cars. The aim of this paper is to achieve accident analysis by tracking the working process of vehicles. In addition to this, the car black box system sends an alert message to the user mobile which is connected through Bluetooth module. The black box system also uses GPS sensor to collect the data location. The car black box system mainly helps the insurance companies to do car crash investigations and to record the road status to prevent or decrease death rates. This paper proposes a technique to monitor the vehicle performance and the behavior of the driver using sensors with the use of IoT technology.*

I. INTRODUCTION

The World Health Organization (WHO) says that every year millions of people demise due to vehicle accidents. To prevent this, the car black box system is introduced. Like black box in flight, the car black box technology can play a vital role in vehicle crash investigations. Hence it is significant to have recorders which will track all the activity in vehicles during and after accident or crash. This car black box system is mainly classified into two sections. First section detects and collects the information from the vehicle, and it is implemented using various type of sensors. Second section presents the data to the user in simplified way, and it is implemented by using the Node microcontroller (MCU) which is programmed to record the data and to retrieve the data from the Node MCU. If any vehicle crashes, the geographical co-ordinates or location is sent to the pre-stored mobile number to seek help.The investigators can use this recorded data obtained from the car black box to identify the actual reason of the accident. The black box will give the input about soundness of vehicle and accidents/mishaps and information including the vehicle's mechanical and electrical status . The black box will give the moment criticism for any physical oddities and will provide the war room access to the information on the black box. The black box can be utilized by Field Technician Soldiers, and Command Centre specialist to analyse and fix any issues that may emerge while out on the field or at command post .

A data investigator can utilize the black box to decide the reason for the mishap and give approaches to forestall a future mishap. Field professionals and travellers in the vehicle can utilize the black box on the field to decide vehicle status. At the command centre, mechanics and investigators will utilize the black box to recognize any irregularities with the vehicle, to record ordinary activity information, and to decide the reasons for mishaps if any ought to happen.

II. LITERATURE SURVEY

According to the World Health Organization, more than a million people in the world die each year because of transportation-related accidents. In order to react to this situation, the black box system draws the first step to solve this problem that crosses national boundaries and threatens the safety and health of people worldwide. Introduced to a part of the United States market in 1999, the black box system proved to be efficient. However in the latter case, the system was embedded in the vehicle . Therefore, in addition to improving the treatment of crash victims and the road status in order to decrease the death rate, constructing safer vehicles, and helping insurance companies with their vehicle accidents investigations, the main purpose of this paper is to develop a black box system that can be installed to any vehicle all over the world. Like flight data recorders in aircraft, “black box” technology can now play a key role in motor vehicle crash investigations .

A significant number of vehicles currently on the roads contain electronic systems that record information in the event of a crash. That is why it is so important to have recorders that objectively track what goes on in vehicles before, during and after a crash as a complement to the subjective input that is taken usually from victims, eye witnesses and police reports. This system is committed mainly to two approaches. The first one is how to detect and record data from the vehicle. The second is how to present the data recorded to the user in a simplified way. To implement the first

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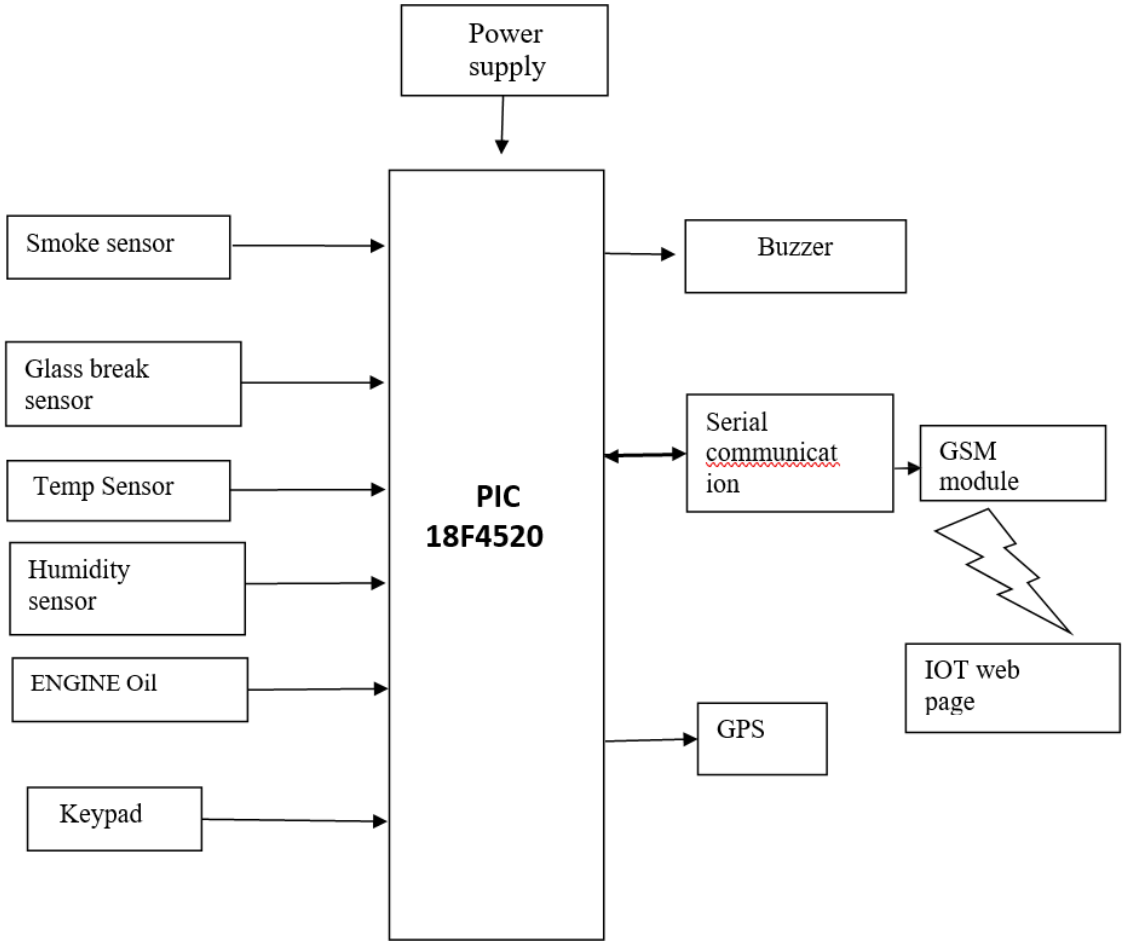
approach, some major components and different type of sensors were used. While the second approach was implemented using a Visual Basic .

NET computer program. This program receives the data serially from the black box memory, presents it in real-time graphics and finally saves it to a formal excel report for future use.In order to know what type of sensors should be installed into the vehicle, research was carried out to identify the main information needed for better accident analysis. After filtering the information and taking into consideration what could be done and what could help the most, the following data were found to be the most important ones needed after an accident: Belt status, Road condition, Brake status, Speed Measurement, Position of the accident, Main Lights status. In this paper, we describe in section II the hardware resources dedicated to VBBS system. The software part is subject of the section III. Finally, a conclusion is given in section IV.

III. BLOCK DAIGRAM



TEST METHOD

Check that component agree with the part list (value and power of resistors, value and voltage eating of capacitor, etc.) if in any doubt double check the polarized components (diodes, capacitor, rectifiers etc.)

If there is a significant time elapse between circuits, take trouble to read the article; the information is often given in a very condensed from. try to get most important point out of the description of the operation of the circuit, Even if you don't understand exactly what is supposed to happen.

- If there is any doubt that some component may not may be equivalent, check that they are compatible.

-Only use good quality IC socket.

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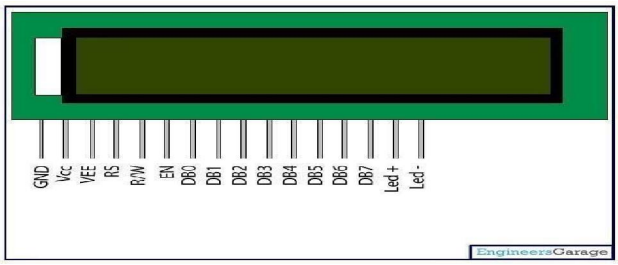
-check the continuity of the tracks on the PCB (and through plated holes with the double sided boards) with a resistance meter or continuity tester.
-Make sure that all drilling, filling and other 'heavy' work is done mounting any component.
-If possible keep any heat sinks well isolated from other components.
-Make wiring diagram if the layout involves lots of wires spread out any all direction.
-check that the connectors used compatible and that they are mounted the right way round.
-Do not reuse wire unless it is of good quality. Cut off the ends and strip it a new.

PIC18F4520 Microcontroller

PIC18F4520 is a low-cost, low-power, high- speed 8-bit, fully-static Microcontroller unit that has 40 pins out of which 36 pins can be used as I/O pins. It has Power- on-Reset (POR) as well as the Extended Watchdog Timer (WDT) circuitry, which can be programmed for 4ms to 131s It is an 8-bit enhanced flash PIC microcontroller that comes with nona Watt technology and is based on RISC architecture. Many electronic applications house this controller and cover wide areas ranging from home appliances, industrial automation, security system and end- user products. This microcontroller has made a renowned place in the market and becomes a major concern for university students for designing their projects, setting them free from the use of a plethora of components for a specific purpose, as this controller comes with inbuilt peripheral with the ability to perform multiple functions on a single chip.

16*2 LCD DISPLAY



LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments). Animations and so on.
A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data.

Humidity Sensor

HR202 is a new kind of humidity-sensitive resistor made from organic macromolecule materials, it can be used in occasions like: hospitals, storage, workshop, textile industry, tobaccos, pharmaceutical field, meteorology, etc.

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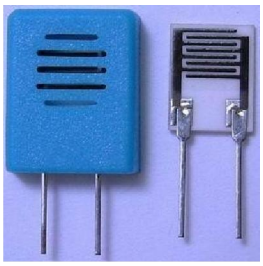

Features

Excellent linearity, low power consumption, wide measurement range, quick response, anti- pollution, high stability, high performance-price ratio.

Technical Specification

- Operating range: humidity(20-95%RH) temperature(0-60Celsius)
- Power supply: 1.5V AC(Max sine)
- Operating frequency: 500Hz-2kHz
- Rated power: 0.2mW(Max sine)
- Central value: 31kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
- Impedance range: 19.8-50.2kΩ(at 25Celsius, 1kHz ,1V AC, 60%RH)
- Accuracy: +-5%RH
- Hysteresis: +-1%RH Long-term
- stability: +-1%RH/year
- Response time: <10s
- Dimensions: with case 12*15*5mm, without case 8*10*0.7mm

GPS Module

The SKG13BL is a complete GPS engine module that features super sensitivity, ultra low power and small form factor. The GPS signal is applied to the antenna input of module, and a complete serial data message with position, velocity and time information is presented at the serial interface with NMEA protocol or custom protocol.

It is based on the high performance features of the MediaTek MT3337 single-chip architecture, Its –165dBm tracking sensitivity extends positioning coverage into place like urban canyons and dense foliage environment where the GPS was not possible before. The small form factor and low power consumption make the module easy to integrate into portable device like PNDs, mobile phones, cameras and vehicle navigation systems

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GSM Module

SIM800A Quad Band GSM/GPRS Serial Modem

This GSM modem has a **SIM800A chip and RS232** interface while enables easy connection with the computer or laptop using the USB to Serial connector or to the microcontroller using the RS232 to TTL converter. Once you connect the SIM800 modem using the USB to RS232 connector, you need to find the correct COM port from the Device Manger of the USB to Serial Adapter. Then you can open Putty or any other terminal software and open an connection to that COM port at 9600 baud rate, which is the default baud rate of this modem.Once a serial connection is open through the computer or your microcontroller you can start sending the AT commands. When you send AT commands for example: "AT\r" you should receive back a reply from the SIM800 modem saying "OK" or other response depending on the command send.

SIM800 is a complete **Quad-band GSM/GPRS** solution in a LGA type which can be embedded in the customer applications. SIM800H support Quad-band 850/900/1800/1900MHz, it can transmit Voice, SMS and data information with low power consumption. With tiny size of 15.8*17.8*2.4 mm, it can fit into slim and compact demands of customer design. Featuring and Embedded AT, it allows total cost savings and fast time-to-market for customer applications.

PIEZOELECTRIC BUZZER

This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval. This buzzer can be used by simply powering it using a DC power supply ranging from 4V to 9V. A simple 9V battery can also be used, but it is recommended to use a regulated +5V or +6V DC supply. The buzzer is normally associated with a switching circuit to turn ON or turn OFF the buzzer at required time and require interval.

Water level sensor:

The water level sensor is a device that measures the liquid level in a fixed container that is too high or too low. According to the method of measuring the liquid level, it can be divided into two types: contact type and non-contact type. The input type water level transmitter we call is a contact measurement, which converts the height of the liquid level into an electrical signal for output. It is currently a widely used water level transmitter.

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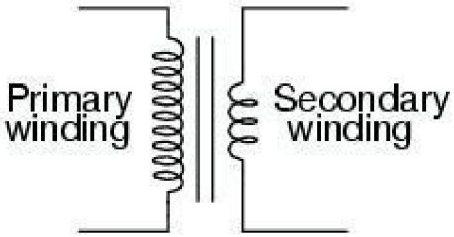
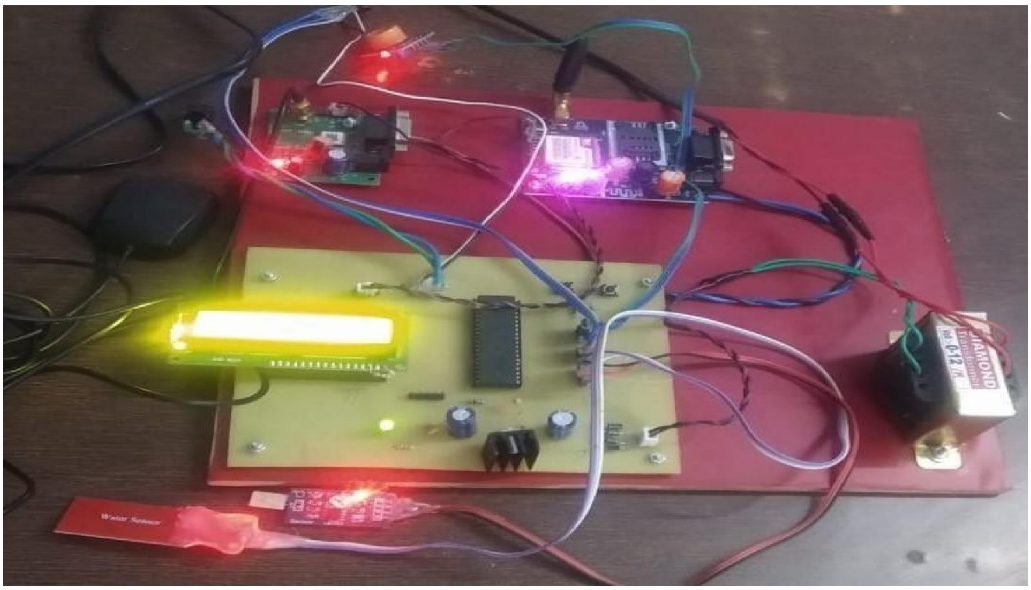
TRANSFORMER

Transformer is a major class of coils having two or more windings usually wrapped arounda common core made from laminated iron sheets. It has two cols named primary and secondary. If the current flowing through primary is fluctuating, then a current will be inducted into the secondary winding. A steady current will not be transferred from one coil to other coil.



IV. RESULT



V. SCOPE OF PROJECT

Black Box system that can be installed into vehicles. The system aims to achieve accident analysis by objectively tracking the vehicle. The system also involves enhancement of security by preventing tampering of the Black Box data .This system consists of Alcohol sensor, Speed measurement sensor, Ultrasonic sensor, MEMS sensor and Mobile GPS. Whenever an abnormal value is detected it will be created in the form of log and send to the cloud it contain location and image. 2. PROPOSED SYSTEM: The proposed system is designed such that, the device itself sends a data to the IOT and this process is done by ESP8266 chip with sensors when an accident is met.

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VI. ACKNOWLEDGMENT

"Perfect and precious guidance, hard work, dedication and full encouragement are needed to complete a project successfully in the life of every student illumination of project work is like engraving a diamond

We take this opportunity on the successful completion of our project so thank all the staff for their valuable guidance, for devoting their precious time, sharing their knowledge and their co-operation throughout all course of development our project and the academic year of education.

We a deep guidance to our project **Prof. PATHAK.J.G (Project Guide)** whose valuable guidance, which has been a key factor in the successful completion of our project. Also we a deep guidance to our project **Prof. Borhade G.L (project Co-ordinator)** has been a key factor in the successful completion of our project A remarkable and unspeakable person in our life **Prof Kulkarni B. L HOD E&TC** Department) whom we havea gratitude and respected for developing entrepreneurship qualities and sharing his knowledge and lifetime experience to make our future glorious Also our special thanks to **Prof. V. B. DHUMAL (Principal)** & management staff whose assistance is also an important part in completion of our project Lastly we take opportunity to thank one and all who directly or indirectly have helped using the successful completion of our project

VII. CONCLUSION

The proposed system will provide important information at the time of any accident. When any type of accident will occur due to any reason, the car black box system provides necessary data to generate the report of accident and its cause. This paper offers a user- friendly program to analyze the data of the accident. This car black box system can be implemented in any vehicle. As soon as the driver runs or start the vehicles the system will start collecting data from all the sensors along with date and time. The data stored in the memory can be retrieved after the accident using Thing Speak cloud.

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